

CERTIFICATE OF MAILING

I hereby certify that this paper (along with any referred to as being attached or enclosed) is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date indicated below.

Dated: October 4, 2006

Laura A. Huntington
Laura A. Huntington

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application for:

Evgueni GOLDBERG et al.

Serial No.: **10/789,810**

Filing Date: **February 27, 2004**

For: **METHOD AND SYSTEM FOR SOLVING
SATISFIABILITY PROBLEMS**

Confirmation No.: **5639**

Examiner: **Omar F. Fernandez Rivas**

Group Art Unit: **2129**

INFORMATION DISCLOSURE STATEMENT

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In accordance with 37 CFR §§ 1.97 and 1.98, the items identified in this Information Disclosure Statement (IDS) are being brought to the attention of the Office. The items are listed on the attached forms PTO/SB/08A and PTO/SB/08B. The Examiner is requested to make these documents of record.

The items identified in this IDS may or may not be "material" pursuant to 37 CFR § 1.56. The submission thereof by Applicant(s) is not to be construed as an admission that any such patent, publication or other information referred to therein is material or considered to be material (37 CFR § 1.97(h)), or even qualifies as "prior art" under 35 USC § 102 with respect to this invention unless specifically designated by Applicant(s) as such.

1. Timing of the Information Disclosure Statement:

☐ This IDS is believed to be timely in that it is being submitted under 37 CFR § 1.97(b), that is (1) with the new patent application submitted herein (37 CFR § 1.97(a)); or (2) within three months of the filing date of the application, which is not a continued prosecution application filed under § 1.53(d) or (3) within three months of entry of the national stage as set forth in 37 CFR § 1.491; or (4) before the mailing of a first Office action on the merits; or (5) before the mailing of a first Office action after filing a request for continued examination under § 1.114. Thus, no fee is required.

☐ However, if the undersigned is in error in this regard, Applicant(s) respectfully requests that the Office consider this IDS as filed under 37 CFR § 1.97(c), if applicable, and charge the fee due under 37 CFR § 1.17(p) to the deposit account referenced below.

☐ However, if the undersigned is in error in this regard, Applicant(s) respectfully requests that the Office consider this IDS as filed under 37 CFR § 1.97(c), if applicable, and a statement under 37 CFR § 1.97(e) is included below, thus no fee is required.

☒ This IDS is being submitted under 37 CFR § 1.97(c), that is after mailing of a first Office Action on the merits, but before a Final Action under 37 CFR § 1.113 or a Notice of Allowance under 37 CFR § 1.311.

☒ Charge the fee due under 37 CFR § 1.17(p) to the deposit account referenced below.

☐ The fee due under 37 CFR § 1.17(p) is being concurrently submitted with the filing of an electronic IDS submission. Thus, no additional fee is required.

☐ A statement under 37 CFR § 1.97(e) is included below, thus no fee is required. In the event that this IDS is not received before a Final Action or a Notice of Allowance, then Applicant(s) respectfully requests that the Office consider the filing of these papers to be submitted under 37 CFR § 1.97(d) and charge the fee due under 37 CFR § 1.17(p) to the deposit account referenced below.

☐ This IDS is being submitted under 37 CFR § 1.97(d), that is after a Final Action under 37 CFR § 1.113 or a Notice of Allowance under 37 CFR § 1.311, but before payment of the issue fee. A statement under 37 CFR § 1.97(e) is included below. Charge the fee due under 37 CFR § 1.17(p) to the deposit account referenced below.

☐ This IDS is being submitted under 37 CFR § 1.97(i), that is after a Final Action under 37 CFR § 1.113 or a Notice of Allowance under 37 CFR § 1.311, but before payment of the issue fee.

STATEMENT UNDER 37 CFR § 1.97(e):

☐ That each item of information contained in the IDS was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the IDS; or

☐ That no item of information contained in the IDS was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the IDS was known to any individual designated in 37 CFR § 1.56(c) more than three months prior to the filing of the IDS.

2. Copies of the Cited Items:

☒ Copies of all of the items listed on the attached forms PTO/SB/08B are enclosed.

☐ Copies of only the following items listed on the attached forms PTO/SB/08A (Item No. *) are enclosed.

☒ A copy of the following item listed on the attached form PTO/SB/08A (Item No. 1) is not enclosed. See 37 CFR 1.98(a)(2)(i).

☐ Copies of the following documents listed in PTO/SB/08A (Item Nos. *) and PTO/SB/08B (Item Nos. *) are not supplied as they were previously cited by the Office or submitted in Information Disclosure Statements in related applications (Application No. *, filed *) and relied upon in this application for an earlier filing date under 35 USC § 120. See 37 CFR § 1.98(d). The Examiner is requested to make these documents of record.

☐ Copies of the following items listed on the attached forms PTO/SB/08A (Item Nos. *) and PTO/SB/08B (Item Nos. *) were cited in a foreign examination report in a related case. A copy of the search report and the cited references not already of record in this application are attached hereto.

3. Concise Explanation of Relevance:

☒ A concise explanation of relevance of items 1 - 18 and 20 - 24 listed on forms PTO/SB/08A and PTO/SB/08B is not given.

☒ A concise explanation of Item 19 listed on PTO/SB/08B is that inventor Yakov Novikov has identified Item 19 as disclosing subject matter identical or similar to elements (a), (c), (e) (f), and (g) from original claim 1 as well as the elements recited in original claims 16 through 20.

4. Related Applications:

☐ Applicant(s) brings to the Office's attention the following related application(s): U.S. Patent Application No. *, filed *.

5. Conclusion:

Citation of the above documents shall not be construed as:

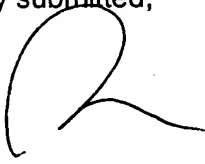
1. an admission that the documents are necessarily prior art with respect to the instant invention;
2. a representation that a search has been made, other than as described above; and
3. an admission that the information cited herein is, or is considered to be, material to patentability as defined in § 1.56(b).

It is respectfully requested that the Examiner indicate consideration of the cited references by returning a copy of the attached forms PTO/SB/08A and PTO/SB/08B with initials or other appropriate marks. In the unlikely event that the transmittal letter is separated from this document and the U.S. Patent Office determines that an extension and/or other relief is required, Applicant(s) petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 50-2518, referencing

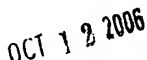
7031042001 However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

Respectfully submitted,

Dated: 10/11/06

By: 
Peter C. Mei
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Form 1449A/PTO

(Use as many sheets as necessary)

Sheet	1	of	3
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Complete if Known

Application Number	10/789,810
Filing Date	02/27/2004
First Named Inventor	Evgueni Goldberg
Art Unit	2129
Examiner Name	Omar F. Fernandez Rivas
Attorney Docket Number	CA7031042001

[illegible][illegible]

Examiner
Signature

Date Considered

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.¹ Applicant's unique citation designation number (optional).² See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04.³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3).⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document.⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible.⁶ Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**

(Use as many sheets as necessary)

Sheet 2 of 3

Complete if Known

Application Number	10/789,810
Filing Date	02/27/2004
First Named Inventor	Evgueni Goldberg
Art Unit	2129
Examiner Name	Omar F. Fernandez Rivas
Attorney Docket Number	CA7031042001

NON PATENT LITERATURE DOCUMENTS

Examiner Initials *	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ²
	2	BAPTISTA, L. et al.; "The Interplay of Randomization and Learning of Real-World Instances of Satisfiability"; Proceedings of the AAAI Workshop on Leveraging Probability and Uncertainty in Computation; July 2000.	
	3	BAYARDO, R. et al.; "Using CSP Look-Back Techniques to Solve Real-World SAT Instances"; Proceedings of the Fourteenth National Conference on Artificial Intelligence and Ninth Innovative Applications of Artificial Intelligence Conference; 1997; pp. 203-208; American Association for Artificial Intelligence Press; USA.	
	4	BEN-SASSON, E. et al.; "Near-Optimal Separation of Treelike and General Resolution"; Electronic Colloquium on Computational Complexity, Report No. 5; Third Workshop on the Satisfiability Problem - May 2000; January 17, 2000; pp. 14 - 18; ECCC; Israel.	
	5	BIERE, A., et al.; "Symbolic Model Checking Using SAT Procedures Instead of BDDs"; Proceedings of Design Automation Conference - DAC'99; 1999; pp. 317 - 320; ACM; USA.	
	6	BRAYTON, R.K., et al.; "Logic Minimization Algorithms for VLSI Synthesis"; Kluwer Academic Publishers, 1984; USA.	
	7	BURCH, J. R., et al.; "Tight Integration of Combination Verification Methods"; Proceedings of the International Conference on Computer-Aided Design; 1998; pp. 570 - 576; ACM, USA.	
	8	DAVIS, M., et al.; "A Machine Program for Theorem-Proving"; Communications of the ACM; 1962; pp. 394 - 397; USA.	
	9	DUBOIS, O., et al.; "SAT versus UNSAT"; Second DIMACS Series in Discrete Mathematics and Theoretical Computer Science; 1996; pp. 415 - 436; Volume 26; American Mathematical Society.	
	10	FREEMAN, J.W.; "Improvements to Propositional Satisfiability Search Algorithms"; A Dissertation in Computer and Information Science, University of Pennsylvania, 1995; 1995; USA.	
	11	GOLDBERG, E. et al.; "Using SAT for Combinational Equivalence Checking"; Proceedings of the Design Automation and Test in Europe Conference - 2001; 2001; pp. 114 - 121; IEEE; USA.	
	12	GOMES, C. P., et al.; "Boosting Combinatorial Search Through Randomization"; Proceedings of the International Conference on Principles and Practice of Constraint Programming; 1998; pp. 431 - 437; American Association for Artificial Intelligence Press/ The MIT Press; USA.	
	13	GOMES, C. P., et al.; "Heavy-Tailed Distributions in Combinatorial Search"; Principles and Practice of Constraint Programming - CP97; 1997; pp. 121 - 135; Springer.	
	14	LI, C. M.; "A Constraint-Based Approach to Narrow Search Trees for Satisfiability"; Information Processing Letters 71; 1999; pp. 75 - 80; Volume 71; Elsevier Science B.V.; France.	
Examiner Signature			Date Considered

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ Applicant's unique citation designation number (optional). ² Applicant is to place a check mark here if English language Translation is attached.

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**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**

(Use as many sheets as necessary)

Sheet

3

of

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First Named Inventor	Evgueni Goldberg
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Examiner Name	Omar F. Fernandez Rivas
Attorney Docket Number	CA7031042001

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Examiner Initials *	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ²
	15	MARQUES-SILVA, J.; "The Impact of Branching Heuristics in Propositional Satisfiability Algorithms"; Proceedings of the 9th Portuguese Conference on Artificial Intelligence (EPIA); September 1999; LNAI; pp. 62 - 74; 1695; Portugal.	
	16	MARQUES-SILVA, J. P. et al.; "GRASP: A New Search Algorithm for Satisfiability"; CSE-TR-292-96; April 10, 1996; pp. 1 - 17; The University of Michigan; USA.	
	17	MARQUES-SILVA, J. P. et al.; "GRASP: A Search Algorithm for Propositional Satisfiability"; IEEE Transactions on Computers; May 1999; pp. 506- 521; Volume 48; No. 5.	
	18	MOSKEWICZ, M. W. et al.; "Chaff: Engineering an Efficient SAT Solver"; Proceedings of the 38th Design Automation Conference -DAC '01; 2001; pp. 530 - 535; ACM; USA.	
	19	NOVIKOV, Y. A.; "Using Restarts When Solving SAT-Instances"; Proceedings of the Fourth International Conference on Computer-Aided Design of Discrete Devices CAD DD '01; 2001; pp. 166 - 174; Volume 3; National Academy of Sciences of Belarus Institute of Engineering Cybernetics; Republic of Belarus.	
	20	STEPHAN, P., et al.; "Combinational Test Generation Using Satisfiability"; IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems; September 1996; pp. 1167 -1176; Volume 15; Number 9; IEEE; USA.	
	21	VELEV, M. N.; Curriculum Vitae; 2004; http://www.ece.cmu.edu/~mvelev .	
	22	ZHANG, H.; "SATO; An Efficient Propositional Prover"; Proceedings of the 14th International Conference on Automated Deduction - CADE- 14; July 1997; pp. 272 - 275; Springer; Australia.	
	23	SATLIB - Benchmark Problems; 2004; http://www.satlib.org/benchm.html .	
	24	The SAT-Ex site; 2004; http://www.lri.fr/~simon/satex/satex.php3 .	
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